REMARKS

Claims 1-20 were pending in this application when last examined. The specification and claims 1-20 are currently amended. Support for the amendments can be found in the specification and original claims as filed. No new matter has been added.

Support for amended claim 1 can be found, for example, at page 4, lines 1-2; page 8, lines 27-28; and page 9, lines 29-31. Support for amended claim 19 can be found, for example, at page 7, line 25 to page 8, line 1.

SPECIFICATION

At page 2, item 1, the Office Action objects to the specification and requests that the specification be amended to contain a specific reference to the priority application. The specification has been so amended. Accordingly, Applicants request reconsideration and withdrawal of the objection.

Applicants respectfully point out that the specific reference to the prior application can appear in the specification and/or in an application data sheet (see, MPEP 201.11 III and III D). Applicants further note that an application data sheet was submitted on June 28, 2006 with the priority information.

CLAIM REJECTIONS - 35 USC § 102

At page 2, item 3, the Office Action rejects claims 1, 4, 6-8, 10-18 and 20 under 35 U.S.C. § 102(a) as being anticipated by CROSSMAN-BOSWORTH et al. (US 2004/0151466). Applicants respectfully traverse the rejection.

Claim 1 is directed to a miniature confocal optical head for a confocal imaging system. The optical head comprises in part a point source for producing a light, a ball lens arranged at the end of the optical head causing the light beam to converge into an excitation point situated in a subsurface field under observation of a sample, and scanning means for displacing the point source in rotation along two axes passing through the center of the ball lens so that the excitation point scans said field under observation. Also, the ball lens is partially arranged outside the body constituting the optical head such that when the optical head is positioned on the sample, the outer part of the ball lens constitutes a protuberance pushing into the sample. CROSSMAN fails to teach or suggest a confocal optical head having this combination of features.

CROSSMAN discloses a compact scanner that includes a waveguide for conveying light between a proximal end and a distal end (see, paragraph [0009]). CROSSMAN also discloses a ball lens at the distal end (see, Fig. 1A, ball lens (14); Figs. 5C and 5D, ball lens (44); Fig. 7A, ball lens (64)).

CROSSMAN fails to disclose, however, a scanning means for displacing the point source in rotation along two axes passing through the centre of the ball lens, as featured in claim 1. In contrast to the presently claimed optical device, CROSSMAN discloses a device wherein there is a small movement of the effective light source along the axis of the waveguide as a result of lateral bending of the waveguide during vibratory scanning (se, paragraph [0086]). Indeed, there is an axial movement of the waveguide at the distal end. Such an axial movement of the waveguide distal end is contradictory to a point source in rotation along two axes passing through the centre of the ball lens.

Furthermore, CROSSMAN also fails to disclose that the ball lens is partially arranged outside the body constituting the optical head such that when the optical head is positioned on the sample, the outer part of the ball lens constitutes a protuberance pushing into the sample. Indeed, CROSSMAN fails to disclose any sample or any specific position of the optical head relative to a sample. All the more, CROSSMAN discloses a scan lens between the optical fiber having a microlens and the illuminated region (see, Fig. 10B and paragraph [0073]).

For all of these reasons, CROSSMAN fails to teach or suggest, and does not anticipate a confocal optical head having the arrangement of features as recited in claim 1, and claims 4, 6-8, 10-18 and 20 dependent thereon. Accordingly, Applicants

respectfully request reconsideration and withdrawal of the rejection.

In further regard to claim 6, CROSSMAN fails to disclose any fine rigid curved plate designed to allow the ball lens to slide over the sample, as CROSSMAN makes no specific mention of any sample.

In further regard to claim 10, CROSSMAN fails to disclose any means for carrying out scanning along two rotational axes of the ball lens. On the contrary, CROSSMAN utilizes a scanning around the vibratory node which is not coincident with the centre of the ball lens, as illustrated in the figures.

In further regard to claim 11, the scanning in CROSSMAN is not along a rotational axes of the ball lens.

Accordingly, Applicants respectfully request reconsideration and withdrawal of these rejections.

CLAIM REJECTIONS - 35 USC § 103

At page 6, item 6, the Office Action rejects claims 2 and 3 under 35 U.S.C. § 103(a) as being unpatentable over CROSSMAN in view of BOPPART et al. (US 6,485,413).

At page 7, item 7, the Office Action rejects claim 5 under 35 U.S.C. § 103(a) as being unpatentable over CROSSMAN in view of WILTA et al. (EP 0664101).

At page 8, item 8, the Office Action rejects claim 9 under U.S.C. § 103(a) as being unpatentable over CROSSMAN in view of SEIBEL et al. (US 6,294,775).

At page 9, item 9, the Office Action rejects claim 19 under U.S.C. § 103(a) as being unpatentable over CROSSMAN in view of TEARNEY et al. (US 2002/0122246).

Applicants respectfully traverse each of these rejections.

First of all, as detailed in the above remarks, CROSSMAN fails to teach or suggest a confocal optical head having the arrangement of features as recited in claim 1. None of the cited secondary references remedy the above noted deficiencies in CROSSMAN. For this reason alone, any combination of cited references fails to render obvious any of the above rejected dependent claims.

Furthermore, the presently claimed optical head includes at least two distinguishing features. The first feature is the ball lens partially arranged outside the body constituting the optical head such that when the optical head is positioned on the sample, the outer part of the ball lens constitutes a protuberance pushing into the sample. One technical effect of this feature is that there is no use of any transparent glass window separating the ball lens and the sample.

A second distinguishing feature is the scanning means displacing the point source in rotation along two axes passing

through the center of the ball lens. One technical effect of this feature is that the optical geometric aberrations of the optical head as a whole are minimized.

Consequently, both features refer to the same technical problem: “how to conceive an optical beam scanning system wherein the optical aberrations are minimized?” CROSSMAN fails to teach or suggest minimizing optical aberrations of the optical head by displacing the point source in rotation along two axes passing through the center of the ball lens and by suppressing a glass window between a sample and the ball lens.

BOPPART et al.

BOPPART discloses a single-mode fiber (58) fixed to a GRIN lens (62) such as a ball lens (see, Fig. 4a). Referring to Fig. 4c, one or more movable wires or guides (90) are used to mechanically displace in a push/pull manner the fiber/lens unit in an arc about a pivot point (94) (see, column 12, lines 35-37). In this configuration, small movements of the wire will result in large arc displacements of the fiber/lens unit (see, column 12, lines 43-44). Consequently, one of ordinary skill in the art would not have modified CROSSMAN with BOPPART to arrive at scanning means displacing the point source in rotation along two axes passing through the center of the ball lens.

Regarding the suppression of a transparent glass window separating the ball lens and the sample, BOPPART recommends the

use of a transparent window, albeit optional (see, column 11, lines 28-32). Because BOPPART recommends a transparent window separating the ball lens and the sample, and then listing many advantages but no disadvantages of this configuration, one of ordinary skill would not consider developing a device without a transparent window in order to minimize the optical geometrical aberrations.

For these additional reasons, CROSSMAN and BOPPART would not have rendered claims 2 and 3 obvious. Accordingly, Applicants request reconsideration and withdrawal of the rejection.

WILTA et al.

WILTA describes a biological viewing instrument comprising a lens associated with means for cleaning and shielding the lens. WILTA, however, fails to disclose any optical beam scanning system. Thus, one of ordinary skill would not have considered trying to improve the CROSSMAN device in order to conceive an optical beam scanning system wherein the optical aberrations are minimized.

Even if one did consider these teachings, WILTA does not deal with the technical problem of minimizing optical aberration. WILTA fails to disclose both a scanning means displacing a point source in rotation along two axes passing through the center of a ball lens, and an outer part of a ball

lens constituting a protuberance pushing into the sample. According to WILTA, it is the lens of a viewing camera that penetrates into a cavity of a living body. The technical field is far from the technical field of optical beam scanning systems and a cavity is disclosed which implies no pushing into the sample.

For these additional reasons, CROSSMAN and WILTA would not have rendered claim 5 obvious. Accordingly, Applicants request reconsideration and withdrawal of the rejection.

SEIBEL et al.

SEIBEL does not disclose any ball lens, so it follows that SEIBEL does not disclose a scanning means displacing the point source in rotation along two axes passing through the centre of such a ball lens. SEIBEL discloses a fiber optic scanning device comprising a lens (37) at the distal end of the waveguide, and a lens (39) serving as a scan lens between lens (37) and a sample. Thus, SEIBEL fails to disclose a ball lens being partially arranged outside the body constituting the optical head such that when this optical head is positioned on the sample, the outer part of the ball lens constitutes a protuberance pushing into the sample.

For these additional reasons, CROSSMAN and SEIBEL would not have rendered claim 9 obvious. Accordingly, Applicants request reconsideration and withdrawal of the rejection.

TEARNEY et al.

TEARNEY also does not disclose any ball lens, and so it does not disclose a scanning means displacing the point source in rotation along two axes passing through the center of a ball lens. TEARNEY relates to a scanning confocal microscopy system comprising a transparent window (72) to protect the optical components from moisture, dust and so forth. Thus, one of ordinary skill combining TEARNEY and CROSSMAN would have provided a device with such a window in order to protect the optical components. Finally, TEARNEY fails to disclose that such a transparent window could be suppressed in order to minimize optical aberrations.

For these additional reasons, CROSSMAN and TEARNEY would not have rendered claim 19 obvious. Accordingly, Applicants request reconsideration and withdrawal of the rejection.

CONCLUSION

Entry of the above amendments is earnestly solicited. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Should there be any matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

The Commissioner is hereby authorized in this, concurrent, and future submissions, to charge any deficiency or

credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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